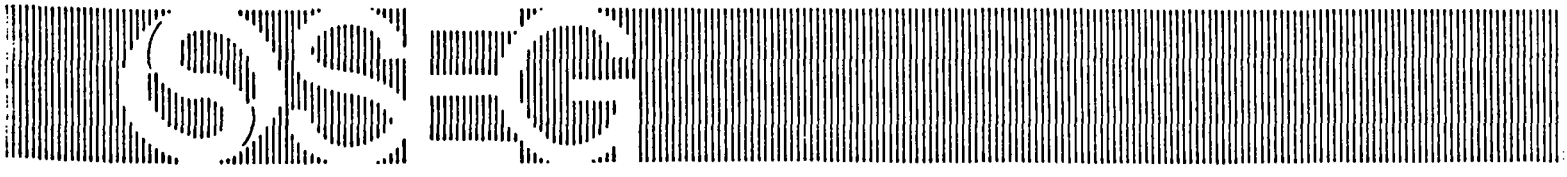
FINAL REPORT
CLEAN-UP OF
PROPYLENE OXIDE SPILL

REN PLASTICS, INC.



FINAL REPORT

CLEANUP OF PROPYLENE OXIDE SPILL

AT REN PLASTICS, INC.

Prepared For:

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INTRODUCTION

On April 4, 1985, Ren Plastics, Inc. (RPI) requested Snell Environmental Group, Inc. (SEG) to investigate a leak of propylene oxide at their Dawn Avenue facility. SEG was also requested to manage any subsequent cleanup activities. The propylene oxide used by RPI is a liquid stored in two underground tanks located as indicated on the attached site plan, Figure 1.

FIELD ACTIVITIES

Prior to SEG's involvement, RPI personnel had conducted preliminary investigations and had excavated a trench exposing the chemical supply line from the pumphouse to the main building. Testing of soil samples obtained at sites in the excavation, designated on Figure 1 as B and G, indicated high concentrations of the contaminant. All laboratory analyses of the soil and water samples from this overall investigation were conducted by RPI and are included in Attachment No. 1.

SEG, utilizing Keck Consulting Services, conducted an investigation to delineate the movement of the leaked contaminant. Accordingly, soil borings 1 through 7 were located as shown on the site plan. Soil borings 1, 2 and 3 were hand borings and could not be advanced significantly below the water table due to the soil collapsing around the hand auger causing some uncertainty about the representative nature of the soil sample. Utilizing a truck-mounted drilling rig, soil samples were acquired in borings 4, 5, 6, and 7 at 2-foot intervals for laboratory analyses. Temporary well casings were installed in borings 3, 4, and 6 to facilitate obtaining representative groundwater samples. A soil sample at the base of the pumphouse foundation next to the buried tank was also acquired by hand auger.

A monitoring well was installed approximately midway between the leak area and the river with the screen set next to the storm sewer.

During the period of the investigation, RPI personnel obtained water samples from the storm sewer discharge to the river. Groundwater samples were obtained from the existing monitoring wells, the locations of which are shown on the attached Figure 1.

Air testing of the chemical supply line was carried out and it was determined by visual observation of the line under water that the line was leaking at approximately sample Location B.

SITE HYDROGEOLOGY

The hydrogeology of the site is described in a report prepared by Keck Consulting Services dates March 7, 1983. This report was prepared to evaluate the potential impacts of the RPI tank farm on the local groundwater. The borings completed on the site showed shallow silty sands underlain by clay till. The static water levels were determined to be between 5.7 feet to 6.8 feet below grade with an apparent flow direction to the northwest. The report indicated that while the expected groundwater flow direction should be south to the river, the underdrain tile around the tank farm may locally affect the flow direction.

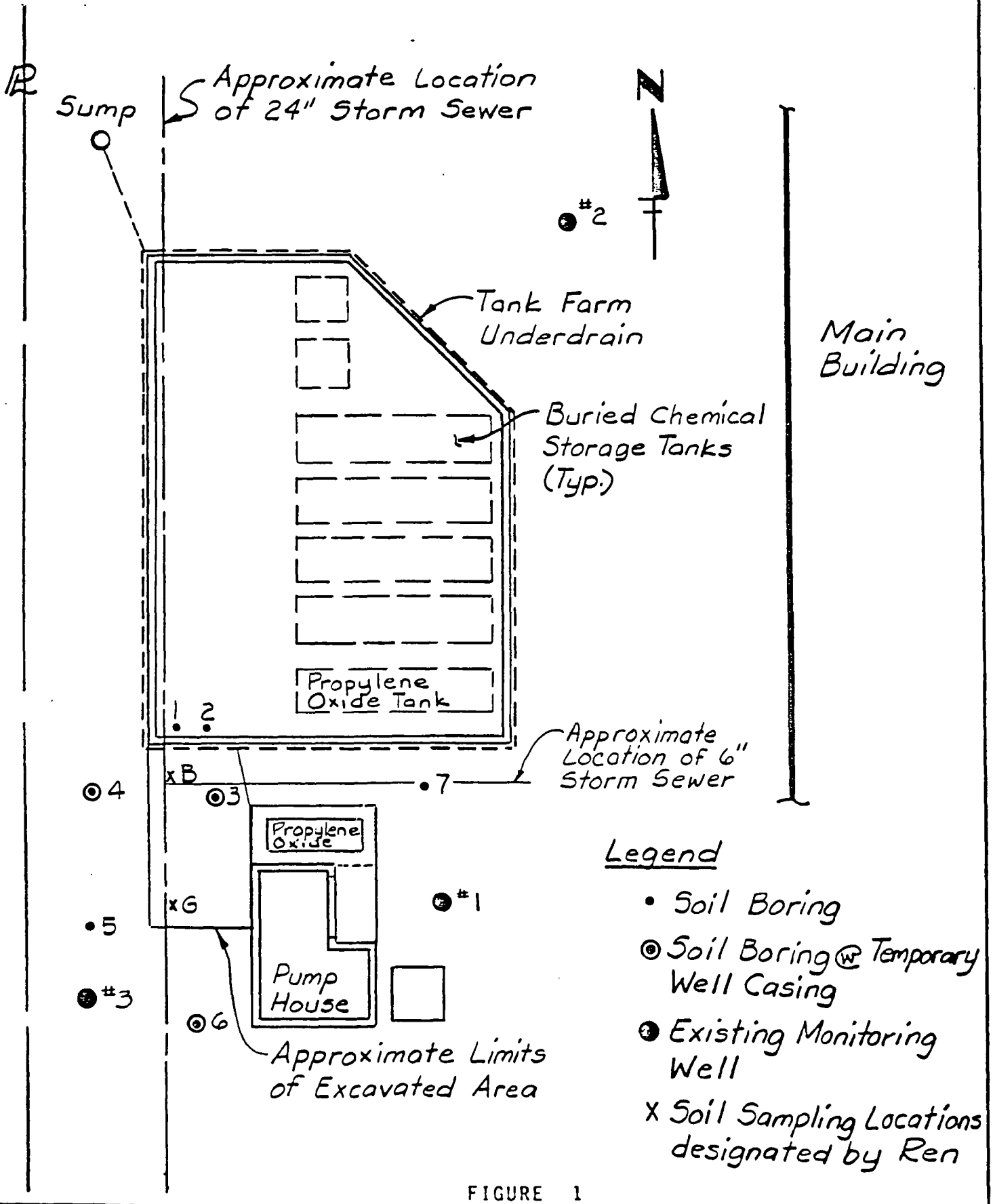


FIGURE 1

SSEG

Engineers • Planners • Consultants

REN PLASTICS SITE PLAN

However, during the field investigation of the leak, it was pointed out that 6-inch and 24-inch storm sewers passed underneath the spill area and discharge to the river. This may further complicate the local groundwater movement. It was felt after subsequent work that liquid from the spill was infiltrating into the 24-inch storm sewer through the 6-inch sewer.

DISCUSSION OF RESULTS

The laboratory analyses from the soil and groundwater testing showed that contamination was present in the excavated area. The highest concentrations were found in Location B (north pit). High concentrations of the contaminant were found at Location G (south pit) and in soil boring 3, both water and soil samples. The contaminant was also detected in the storm sewer discharge to the river. However, soil and groundwater samples from borings 1, 2, 4, 5, 6, and 7 showed no detectable levels of contaminants. The monitoring well installed next to the storm sewer, with the screen set at the same level as the sewer, was a dry well (as of April 12, 1985). During the drilling of the well, no stone (sand) bedding was noted to be around the pipe.

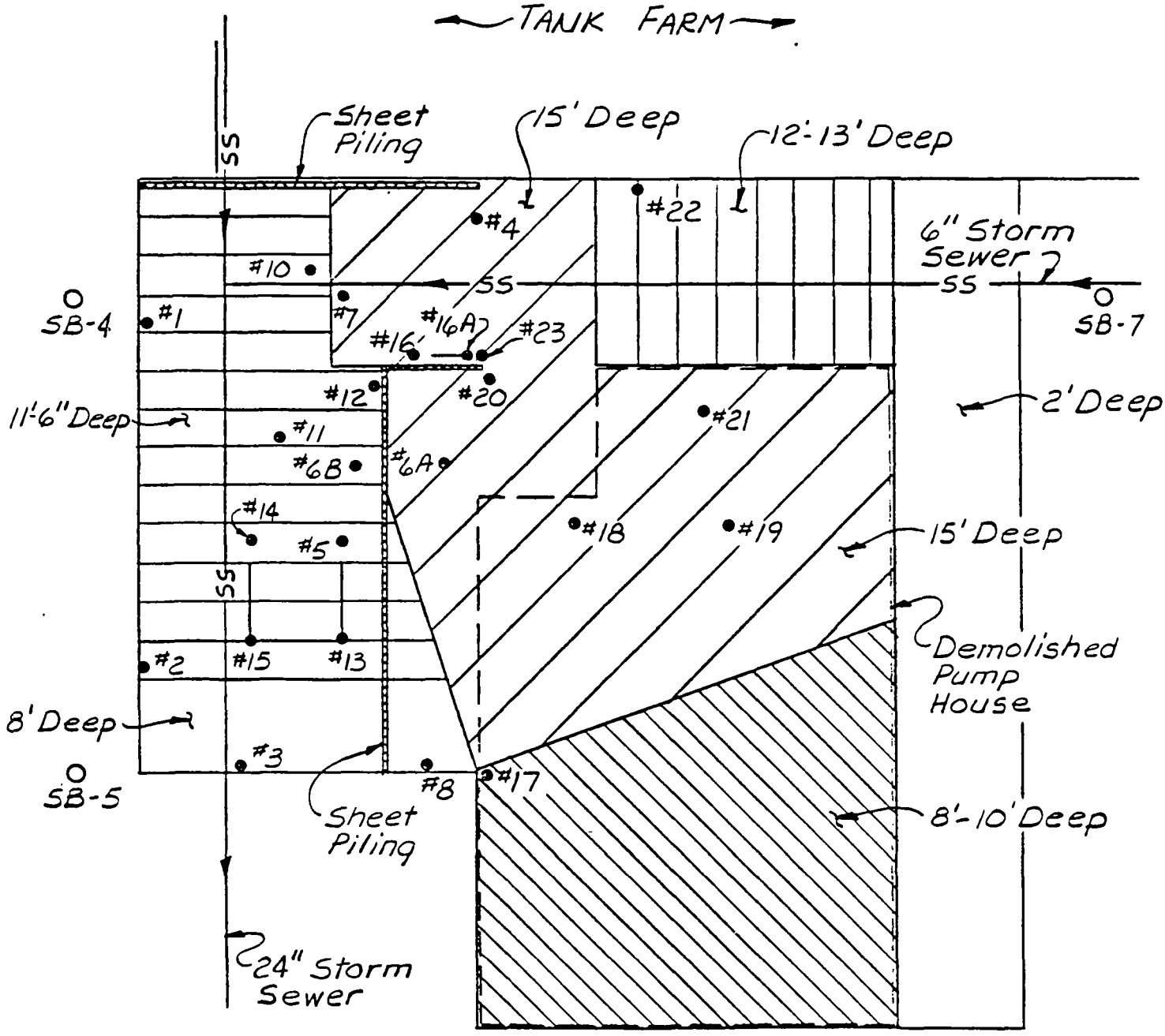
CONCLUSIONS

Based upon the laboratory results and our interpretation of the various soil data, we conclude that the material that leaked from the pipe has been laterally contained within a maximum area outlined by borings 1, 2, 4, 5, 6, and 7. This lateral containment is consistent with the hydrogeological report that the material above the clay till is of low permeability and does not transmit water readily. Because of the presence of propylene oxide in the storm sewer discharge, we concluded that the material from the leak was moving vertically to the storm sewers and infiltrating into the pipes by means of cracks or leaking pipe joints.

This vertical leakage would be expected to be occurring through the sand (granular) bedding which is normally installed around underground conduits. A clean sand was encountered at 28 inches below the chemical supply line at sample Locations B and G. The storm sewers may be acting as a sump or a discharge point for groundwater in the leak area. The monitoring well installed next to the 24-inch storm sewer at a point midway between the leak area and the river was a dry well. Furthermore, no evidence was found of sand bedding around the 24-inch sewer pipe. Consequently we concluded that the contaminant is not flowing along the outside of this sewer.

CLEANUP ACTIVITIES

The work of cleaning up the contaminated area was awarded to Granger Excavating Company, Lansing, Michigan. Because contamination had been identified at a depth below the foundations of the tank farm retaining wall and the pumphouse, Granger installed sheet piling, as indicated on the attached sketch, Figure 2, to prevent their collapse. Excavation was initiated in the area of highest contaminant concentrations. As material was excavated and the underlying clay till was exposed, soil samples were taken both from the till surface and from the exposed sidewalls. Additional samples were obtained from beneath the pumphouse foundation. The attached sketch, Figure 2, shows the areas that were excavated, the varying depths of excavation and the sampling locations.



• #18 Sample Location

○ SB-5 Soil Boring

FIGURE 2

EXCAVATION PLAN & SAMPLING SITES

These samples were then analzyed for the contaminant to provide a qualitative analyses of the effectiveness of the cleanup activities. A laboratory result of LT 1 ppm was used as an indication that contamination had not migrated to that area and that the area was therefore unaffected by the leak.

Sample points #7 at 11'-6" deep, #14 at 11'-6" deep, #15 at 8' deep, #13 at 8' deep and #1 and #2 at 4'-5' deep showed non-detectable levels of the contaminant, confirming that all contamination in that area had been removed.

Samples obtained next to and under the pumphouse foundation, #16 and the 6A series, showed contamination under the building. The decision was made to remove the building and the soil under the foundation. A similar approach was utilized to determine the effectiveness of the cleanup. Consequently, sample points #8, #17, #19, #20 and #22 were analyzed and show that the contaminant was non-detectable.

All materials that were excavated were subjected to a field ignitability test to confirm that it could be deposited in a Type II (non-hazardous) landfill. All materials were then deposited in the Granger Landfill located in Watertown Township, Clinton County. Overall, 460 cubic yards of material, rubble and soil were transported to the Granger Landfill.

The excavated area was subsequently backfilled with a clean sand and compacted. Compaction equipment was used to minimize future settlement and to prevent any future movement of the 24-inch storm sewer.

ATTACHMENT NO. 1

ANALYTICAL RESULTS
FOR
SOIL AND GROUNDWATER SAMPLES
DURING THE INITIAL INVESTIGATION

SOIL/WATER ANALYSIS

Location	Date	Propylene Oxide (ppm)
WATER:		
Location #1	03/29/85	2.5
Location #4	03/29/85	19.14
Location #1	04/01/85	2.2
Location #4	04/01/85	17.34
Location #1	04/02/85	<1
Location #4 (second sample)	04/02/85	4
Pump Pit	04/02/85	1.8
Trench	04/02/85	<1
Stones	04/02/85	<1
Location #1	04/03/85	1.3
Location #4	04/03/85	6.4
Location #1	04/04/85	<1
Location #4	04/04/85	8.5
SOIL:		
A (sampled by QC)	04/04/85	<1
B	04/04/85	65
C	04/04/85	102
D	04/04/85	1635
E	04/04/85	>1135
F	04/04/85	>939
G	04/04/85	>92
H	04/04/85	>802
SNELL SOIL SAMPLES:		
Control	04/04/85	<1
South Pit (B)	04/04/85	
4" below pipe		78
6" below pipe		74
16" below pipe		34
23" below pipe		<1
28" below pipe		70
North Pit (G)	04/04/85	
4" below pipe		4.8%
10" below pipe		5.6%
14" below pipe		1.1%
20" below pipe		971
24" below pipe		300
Standing Water in South Pit	04/04/85	40
Standing Water in North Pit	04/04/85	overload

Location	Date	Propylene Oxide (ppm)
Snell Soil Samples, continued		
North Pit	04/05/85	78,970
Location #4	04/05/85	9.8
North Pit	04/05/85	37,230
Location #4	04/05/85	7.5
Trench	04/05/85	1.82
N. Lake	04/05/85	1.82
Location #1	04/05/85	12
Location #4	04/05/85	23.5
Well A	04/05/85	<1
Well B	04/05/85	<1
Well C	04/05/85	2
North (G) Sump Water	04/05/85	>961
S. Lake	04/05/85	12
N. Lake	04/05/85	12
Location #4	04/05/85	13
S. Lake	04/05/85	<1
N. Lake	04/05/85	<1
Bore #1, 2 ft.	04/05/85	<1
Bore #1, 4 ft.	04/05/85	<1
Bore #1, 5.5 ft.	04/05/85	<1
Bore #1, 7 ft.	04/05/85	<1
Bore #1, 7 ft. (water)	04/05/85	<1
Bore #2, 2 ft.	04/05/85	<1
Bore #2, 4 ft.	04/05/85	<1
Bore #2, 8 ft.	04/05/85	<1
Location #1	04/05/85	<1
Location #4	04/05/85	<1
North Pit	04/05/85	4,640
South Pit	04/05/85	11,480
Location #4	04/06/85	10
South Pit	04/06/85	456
North Pit	04/06/85	1,021
Location #1	04/06/85	---
Location #4	04/06/85	9
South Pit	04/06/85	103
North Pit	04/06/85	122
Location #1	04/06/85	<1
Location #4	04/06/85	8
No water for pit samples.		
South Pit	04/06/85	92
North Pit - No Water	04/06/85	---

Location	Date	Propylene Oxide (ppm)
Snell Soil Samples, continued		
Location #1	04/06/85	2
Location #4	04/06/85	13.5
South Pit	04/06/85	25.6
North Pit	04/06/85	16,995
C Well	04/06/85	<1
Location #1	04/06/85	2
Location #4	04/06/85	10
South Pit	04/06/85	34
North Pit	04/06/85	13,715
Location #1	04/07/85	3.26
Location #4	04/07/85	14.3
South Pit	04/07/85	33.92
North Pit	04/07/85	21,068
N Well	04/07/85	<1
SE Well	04/07/85	<1
SW Well	04/07/85	<1
Location #1	04/07/85	2.38
Location #4	04/07/85	12.24
South Pit	04/07/85	29.4
North Pit	04/07/85	27,314.9
Location #1	04/07/85	<1
Location #4	04/07/85	16.2
South Pit	04/07/85	31.8
North Pit	04/07/85	35,668
Location #1	04/07/85	<1
Location #4	04/07/85	12.2
South Pit	04/07/85	32.2
North Pit	04/07/85	35,891
Location #1	04/08/85	<1
Location #4	04/08/85	5.85
South Pit	04/08/85	31.2
North Pit	04/08/85	33,000
Location #1	04/08/85	0
Location #4	04/08/85	7.2
Wells A, B, C	04/08/85	<1
HSB-3, 2.5 ft.	04/08/85	438.5
HSB-3, 4 ft.	04/08/85	2,276.1
HSB-3, 6 ft.	04/08/85	14,468.0

Location	Date	Propylene Oxide (ppm)
Snell Soil Samples, continued		
SB-4, SSS-5, 12-13'	04/08/85	0
SB-4, SSS-4, 10-11'	04/08/85	0
SB-4, SSS-3, 8-9'	04/08/85	0
SB-4, SSS-1, 4-5'	04/08/85	0
Location #1	04/09/85	0
Location #4 (outfall)	04/09/85	44
Wells A, B, C	04/09/85	0
SB-4, SSS-6, 14-15'	04/09/85	0
SB-5, SSS-1, 4-5'	04/09/85	0
SB-5, SSS-2, 6-7'	04/09/85	0
SB-5, SSS-3, 8-9'	04/09/85	0
SB-5, SSS-4, 10-11'	04/09/85	0
SB-5, SSS-5, 12-13'	04/09/85	0
SB-5, SSS-6, 14-15'	04/09/85	0
Soil Bore #3 Trench Groundwater	04/09/85	87,912.5
Location #4	04/09/85	23.8
SB-6, SSS-1, 4-5'	04/09/85	0
SB-6, SSS-2, 6-7'	04/09/85	0
SB-6, SSS-3, 8-9'	04/09/85	0
SB-6, SSS-4, 10-11'	04/09/85	0
SB-6, SSS-5, 12-13'	04/09/85	0
SB-6, SSS-6, 14-15'	04/09/85	0
Soil Bore #4, Water	04/09/85	<1
WATER - SCRAP DRUMS		
Drum 1	04/06/85	686
Drum 2	04/06/85	1,772
Drum 3	04/06/85	8
Drum 4	04/06/85	2,440
Drum 5	04/07/85	1,557.4

NOTES:

- All values in ppm unless otherwise noted.
- Location 1 - u-drain sump.
- Location 4 - storm sewer outfall.

ATTACHMENT NO. 2

ANALYTICAL RESULTS
FOR
SOIL AND GROUNDWATER SAMPLES
DURING THE CLEANUP ACTIVITIES

Sample Site	Depth	Preliminary Result	Corrected Lab Result
1	4'-5'	No P.O.	LT 1
2	4'-5'	No P.O.	LT 1
3	4'-5'	No P.O.	LT 1
4	4'-5'	No P.O.	LT 1
4	7'		4 ppm
5	11'-6" (clay)	LT 1	LT 1
6A	4'-5'	No P.O.	LT 1
6A	7'-6"	3,000 ppm	3891 ppm
6A	8'		*
6A	10' (clay)		*
6A	11'-10" (clay)	262 ppm	262 ppm
6A	12'-5" (clay)	2 ppm	2 ppm
6A	Leachate (from under pumphouse)	200 ppm	200 ppm
6A	8' - 2' horiz.		137 ppm
	- 3-1/2' horiz.		78 ppm
	- 4-1/2' horiz.		47 ppm
6B	4'-5'		*
6B	10' (clay)	1 ppm	LT 1
6B	11'-6" (clay)	LT 1	LT 1
Bottom Composite (2 sites)	11 (clay)	11 ppm	18 ppm
7	10'-6" (clay)	2 ppm	1 ppm
7	11'-6" (clay)		LT 1
8	4'-5'	No P.O.	LT 1
9			*
10	9'	110 ppm	109
10	10'-6"		*
11	10'-6" (clay)	3 ppm	2 ppm
12	10' (clay)	6 ppm	5 ppm
13 (horiz.)	8'	LT 1	LT 1
14	11'-6" (clay)		LT 1
15 (horiz.)	8'		LT 1
16	8'		289
16 (horiz.)	8'		241
Liquid Runoff (over contaminated soil through 6" drain from parking lot), 6/10/85			4.9 ppm
17	8'		LT 1 ppm
18	9' (clay)		1.2 ppm
19	13' (clay)		LT 1 ppm
20	12'-6" (clay)		23.4 ppm
20	15' (clay)		LT 1 ppm
21	11' (clay)		2.04 ppm
22	11' (clay)		LT 1 ppm
23	12' (clay)		4.18 ppm

*Not Analyzed